

*On the Sphærobolus stellatus.*

By the Rev. H. H. HIGGINS, M.A.

The author exhibited a drawing of this plant, in various stages of development, the several processes of which the reverend gentleman had had an opportunity of witnessing. He had found the plant, a minute species of Fungus, in the neighbourhood of Huyton Quarry, on the 20th of September. It was growing on the flat surface of a stump, near the ground. He took it home, with a portion of the wood on which it was growing, and placed it on a bed of damp sand covered with a glass shade. A cluster of similar plants soon sprang up, and the mode of growth in a single specimen was this:—At first appears a little patch of reticulated fibres, the centre of which becomes elevated from beneath by the growth of the young plant, which at length bursts through the web, and assumes the colour and size of a grain of mustard-seed. Subsequently it becomes egg-shaped, and attains a height of about a line. A star-like fissure now divides the apex of the plant into five or six equal segments, which fall back like the petals of a flower, and discover the inner or lining membrane, resembling a minute egg-cup, and containing a *sporangium* or ball of spores. At the period of maturity, this inner membrane suddenly turns itself inside out, with an audible snap, projecting the sporangium to a distance of several inches. The inside of the glass shade used as a cover for the plants became spotted with forty or fifty of these sporangia, which had been ejected with such force as to flatten them against the glass.

A portion of the spore-pulp, under a high magnifier, exhibited innumerable minute particles, displaying with great activity the ordinary Brownian movements. When the pulp was taken from an unripe sporangium, there were also to be seen, by the aid of iodine and a magnifier with very good power of definition, certain other bodies of a linear or slender oblong shape, many times the size of the moving particles, and quite pellucid. These appeared to be attacked and entered by the particles; but whether the linear bodies afterwards became developed into perfect spores, the observer was not able to ascertain.—*Proc. Lit. and Phil. Soc. of Liverpool*, Nov. 17, 1856.

*The Grape Disease.*To the Editors of the *Annals of Natural History*.

Sheffield, Dec. 9, 1857.

GENTLEMEN,—Without at all questioning the influence of the *Oidium* as a cause of the grape-blight, there can be little doubt that in this, as in all similar epidemics, some predisposing cause will be found, by which the vital energies of the organism affected (plant or animal) are depressed, and a vantage-point is thus offered to the disease. We know that if a vegetable be planted in soil totally deprived of some one of the necessary ingredients, it is unable to exist. If, however, instead of the missing constituent, there be found some

analogous substance, the plant may continue to live, though in less perfect health. Thus potash may be to a certain extent replaced by soda, and, as has been observed in certain samples of tobacco, even by lime. In the case of the grape, no rotation of crops is possible, and the probability of exhaustion is therefore so much the greater. The juice of the grape is very rich in potash, which is deposited, on standing, in the form of crude tartar. This potash is not returned to the soil, but is consumed for manufacturing purposes. Without having had the opportunity of proving this view by analysis, I am of opinion that the soil of old vineyards will be found deficient in potash. As a means of remedying this defect, I suggest that granite should be heated to redness, plunged in water, and ground to powder. Let this be well mixed with about half its weight of lime, and the mass be exposed for some time to the action of the atmosphere. This compost may then be sparingly applied as a manure to the vines.

J. W. SLATER.

*On the Cause of the Rhythmic Motion of the Heart.*

By JAMES PAGET, Esq., F.R.S.

The author draws the following conclusions as to the most probable explanation of the rhythmic action of the heart:—

1. In the Vertebrata it is due to the time-regulated discharges of nerve-force in certain of the ganglia in and near the substance of the heart, by which discharges the muscular walls are excited to contraction.

2. In Invertebrata, the corresponding pulsatile movements of hearts or vessels are probably independent of nerve-force.

3. The time-regulated rhythmic action, whether of the nervous centres or of the independent contractile walls, is due to their nutrition being rhythmic, *i. e.* to their being, in certain periods, by nutritive changes of composition, raised, with regulated progress, to a state of instability of composition, in their decline from which they discharge nerve-force, or change their shape, contracting.

4. The muscular substance of the heart in the Vertebrata, governed in its rhythmic action by appropriate nervous centres, has a rhythmic nutrition of its own, corresponding and coordinate with theirs; the impairments of its structure during action being repaired in repose.

5. Rhythmic nutrition is a process in accordance with the general laws of organic life, very many organic processes being composed of timely-regulated alternate action and inaction, or alternate opposite actions, *i. e.* being rhythmical, with larger or shorter units of time; and all organic processes being chronometric, *i. e.* ordered according to laws of time as exact, and only as much influenced by external conditions, as are those relating to weight, size, shape, and composition.—*Proc. of Roy. Soc.* May 28, 1857.